

1 **CLAIMS**

2 1. An editing system comprising:

3 a switch assembly comprising one or more software-implemented matrix  
4 switches, individual matrix switches comprising:

5 one or more input pins configured to receive a data stream; and

6 one or more output pins configured to output a data stream;

7 the one or more input pins being routable to the one or more output  
8 pins, the switch assembly being configured to process both compressed and  
9 uncompressed data streams to provide a compressed output data stream that  
10 represents a user-defined editing project.

11  
12 2. The editing system of claim 1, wherein the switch assembly  
13 comprises multiple switches.

14  
15 3. The editing system of claim 2, wherein one switch is configured to  
16 process compressed data streams.

17  
18 4. The editing system of claim 2, wherein one switch is configured to  
19 process uncompressed data streams.

20  
21 5. The editing system of claim 2, wherein one switch is configured to  
22 process compressed data streams, and one switch is configured to process  
23 uncompressed data streams.

1           6. One or more computer-readable media having computer-readable  
2 instructions thereon which, when executed by a computer, provide the editing  
3 system of claim 1.

4  
5           7. The editing system of claim 1 configured as a multi-media editing  
6 system.

7  
8           8. An editing system comprising:  
9 a media processing object configured to:  
10 receive multiple data streams comprising compressed and  
11 uncompressed data streams; and  
12 process the one or more data streams to provide a compressed output  
13 data stream that represents a media project.

14  
15           9. The editing system of claim 8, wherein the media processing object  
16 comprises a software-implemented switch assembly.

17  
18           10. The editing system of claim 8, wherein the media processing object  
19 comprises a software-implemented switch assembly having multiple pins  
20 configured to receive or provide data streams.

21  
22           11. The editing system of claim 8, wherein the media processing object  
23 comprises multiple software-implemented switches each of which having one or  
24 more pins configured to receive or provide data streams.  
25

1           **12.**    The editing system of claim 8, wherein the media project comprises  
2 a multi-media project.

3  
4           **13.**    A multi-media editing system comprising:  
5 a switch assembly comprising one or more software-implemented matrix  
6 switches, individual matrix switches comprising:

7                   one or more input pins configured to receive a data stream; and

8                   one or more output pins configured to output a data stream;

9                   the one or more input pins being routable to the one or more output  
10 pins, the switch assembly being configured to process both compressed and  
11 uncompressed data streams to provide a compressed output data stream that  
12 represents a user-defined multi-media editing project; and

13           one or more data structures associated with the switch assembly and  
14 configured for use in programming the switch assembly to provide a routing  
15 scheme for routing input pins to output pins for a given multi-media editing  
16 project time line.

17  
18           **14.**    The multi-media editing system of claim 13, wherein the one or  
19 more data structures comprise one or more grid structures, individual grid  
20 structures being configured to contain data that defines an association between  
21 input and output pins for the project time line.

22  
23           **15.**    The multi-media editing system of claim 13, wherein the switch  
24 assembly comprises multiple switches.  
25

1           16.    The multi-media editing system of claim 15, wherein the one or  
2 more data structures comprise a data structure associated with at least some of the  
3 multiple switches.

4  
5           17.    The multi-media editing system of claim 16, wherein the data  
6 structures comprise grid structures that contain data that defines an association  
7 between input and output pins for the project time line.

8  
9           18.    The multi-media editing system of claim 15, wherein one switch is  
10 configured to process compressed data streams, and another switch is configured  
11 to process uncompressed data streams.

12  
13           19.    The multi-media editing system of claim 18, wherein the one or  
14 more data structures comprise data structures associated with the switches that are  
15 configured to process the compressed and uncompressed data streams.

16  
17           20.    The multi-media editing system of claim 19, wherein the data  
18 structures comprise grid structures that contain data that defines an association  
19 between each switch's input and output pins for the project time line.

20  
21           21.    A multi-media editing system comprising:  
22           a switch assembly comprising one or more non-hardware matrix switches,  
23 individual matrix switches comprising:

24                   one or more input pins configured to receive a data stream; and

25                   one or more output pins configured to output a data stream;

1 the one or more input pins being routable to the one or more output pins,  
2 the switch assembly being configured to process both compressed and  
3 uncompressed data streams to provide a compressed output data stream that  
4 represents a user-defined multi-media editing project.

5  
6 **22.** The multi-media editing system of claim 21, wherein the switch  
7 assembly comprises multiple switches.

8  
9 **23.** The multi-media editing system of claim 22, wherein one switch is  
10 configured to process compressed data streams.

11  
12 **24.** The multi-media editing system of claim 22, wherein one switch is  
13 configured to process uncompressed data streams.

14  
15 **25.** The multi-media editing system of claim 22, wherein one switch is  
16 configured to process compressed data streams, and another switch is configured  
17 to process uncompressed data streams.

18  
19 **26.** The multi-media editing system of claim 21 further comprising one  
20 or more data structures associated with the switch assembly and configured for use  
21 in programming the switch assembly to provide a routing scheme for routing input  
22 pins to output pins for a given multi-media editing project time line.

1           **27.**    The multi-media editing system of claim 26, wherein the one or  
2 more data structures comprise grid structures that contain data that defines an  
3 association between input and output pins for the project time line.  
4

5           **28.**    An media processing system comprising:  
6           switch means for receiving compressed and uncompressed data streams  
7 associated with sources that are to be incorporated into a project and processing  
8 the compressed and uncompressed data streams to provide a single compressed  
9 output stream that represents the project; and  
10          programming means associated with the switch means and configured to  
11 program the switch means to provide the single compressed output stream.  
12

13          **29.**    The multi-media editing system of claim 28, wherein the switch  
14 means comprises:  
15

16          first switch means for processing the uncompressed data stream to provide  
17 an output uncompressed data stream;  
18

19          second switch means for processing the compressed data stream to provide  
20 an output compressed data stream; and  
21

22          third switch means for processing the output uncompressed and compressed  
23 data streams to provide the single compressed output stream.  
24

25          **30.**    The multi-media editing system of claim 28, wherein the switch  
means comprises means for providing a data stream as a feedback data stream that  
is processed by the switch means.

1           **31.**    The multi-media editing system of claim 28, wherein the switch  
2 means comprises switch means implemented in software.

3  
4           **32.**    The multi-media editing system of claim 28, wherein the switch  
5 means comprises:

6               first software switch means for processing the uncompressed data stream to  
7 provide an output uncompressed data stream;

8               second software switch means for processing the compressed data stream to  
9 provide an output compressed data stream; and

10              third software switch means for processing the output uncompressed and  
11 compressed data streams to provide the single compressed output stream.

12  
13           **33.**    A multi-media editing system comprising:

14               a first software-implemented matrix switch comprising one or more input  
15 pins and one or more output pins, the one or more input pins being routable to the  
16 one or more output pins, the first matrix switch being configured to process one or  
17 more uncompressed data streams and output an uncompressed data stream;

18               a second software-implemented matrix switch comprising one or more  
19 input pins and one or more output pins, the one or more input pins being routable  
20 to the one or more output pins, the second matrix switch being configured to  
21 process one or more compressed data streams and output a compressed data  
22 stream; and

23               a third software-implemented matrix switch comprising multiple input pins  
24 and multiple output pins, the input pins being routable to one or more output pins,  
25 the third matrix switch being configured to receive an uncompressed data stream

1 from the first switch and a compressed data stream from the second switch and  
2 process the received data streams to provide a single compressed output data  
3 stream that represents a user-defined multi-media editing project.

4  
5 **34.** The multi-media editing system of claim 33 further comprising a  
6 software-implemented compressor element coupled with the third switch and  
7 configured to receive and compress an uncompressed data stream.

8  
9 **35.** The multi-media editing system of claim 34 further comprising a  
10 feedback path between the compressor element and an input pin of the third switch  
11 configured to provide a compressed data stream to the third switch's input pin.

12  
13 **36.** The multi-media editing system of claim 33, wherein the third  
14 switch is programmed to receive, when available, a data stream from the second  
15 switch and, when a data stream is unavailable from the second switch, seek a data  
16 stream from the first switch.

17  
18 **37.** One or more computer-readable having computer-readable  
19 instructions thereon which, when executed by a computer, provide the multi-media  
20 editing system of claim 33.

21  
22 **38.** A multi-media editing system comprising:  
23 first software switch means for processing one or more uncompressed data  
24 streams to provide an uncompressed data stream, the switch means comprising at  
25



1 least one feedback loop that modifies a data stream that is output by the switch  
2 means and provides the modified data stream as an input to the switch means;

3 second software switch means for processing one or more compressed data  
4 streams to provide a compressed data stream; and

5 a third software switch means for receiving an uncompressed data stream  
6 from the first software switch means and a compressed data stream from the  
7 second software switch and processing the received data streams to provide a  
8 single compressed output data stream that represents a user-defined multi-media  
9 editing project.

10  
11 **39.** The multi-media editing system of claim 38 further comprising  
12 programming means associated with the first and second software switch means  
13 for programming routing of data streams therethrough.

14  
15 **40.** A multi-media editing system comprising:

16 a first software-implemented matrix switch comprising one or more input  
17 pins and one or more output pins, the one or more input pins being routable to the  
18 one or more output pins, the first matrix switch being configured to process one or  
19 more uncompressed data streams and output an uncompressed data stream;

20 a second software-implemented matrix switch comprising one or more  
21 input pins and one or more output pins, the one or more input pins being routable  
22 to the one or more output pins, the second matrix switch being configured to  
23 process one or more compressed data streams and output a compressed data  
24 stream;

1 a third software-implemented matrix switch comprising multiple input pins  
2 and multiple output pins, the input pins being routable to one or more output pins,  
3 the third matrix switch being configured to receive an uncompressed data stream  
4 from the first switch and a compressed data stream from the second switch and  
5 process the received data streams to provide a single compressed output data  
6 stream that represents a user-defined multi-media editing project; and

7 one or more data structures associated with at least some of the matrix  
8 switches and configured for use in programming the associated switches to  
9 provide a routing scheme for routing input pins to output pins.

10  
11 **41.** The multi-media editing system of claim 40, wherein the one or  
12 more data structures comprise one or more grid structures that contain data that  
13 defines an association between input and output pins for a project time line.

14  
15 **42.** The multi-media editing system of claim 40, wherein the one or  
16 more data structures comprise multiple data structures, individual data structures  
17 being associated with the first and second switches.

18  
19 **43.** The multi-media editing system of claim 42, wherein the data  
20 structures comprise grid structures each of which contains data that defines an  
21 association between input and output pins of its associated switch for a project  
22 time line.

1           **44.**     A multi-media editing method comprising:

2           providing a switch assembly comprising one or more software-  
3 implemented matrix switches, individual matrix switches comprising one or more  
4 input pins and one or more output pins, the one or more input pins being routable  
5 to the one or more output pins, the switch assembly being configured to process  
6 both compressed and uncompressed data streams to provide a compressed output  
7 data stream that represents a user-defined multi-media editing project; and

8           programming the switch assembly using one or more data structures, said  
9 programming providing a routing scheme for routing input pins to output pins for  
10 a given time period.

11  
12           **45.**     The multi-media editing method of claim 44, wherein said providing  
13 comprises providing multiple switches at least one of which being configured to  
14 process both compressed and uncompressed data streams.

15  
16           **46.**     The multi-media editing method of claim 44, wherein said providing  
17 comprises providing multiple switches, one of which being configured to process  
18 only compressed data streams.

19  
20           **47.**     The multi-media editing method of claim 44, wherein said providing  
21 comprises providing multiple switches, one of which being configured to process  
22 only uncompressed data streams.

1           **48.**    The multi-media editing method of claim 44, wherein said providing  
2 comprises providing multiple switches:

3                   at least one of which being configured to process both compressed  
4 and uncompressed data streams;

5                   at least one of which being configured to process only compressed  
6 data streams; and

7                   at least one of which being configured to process only uncompressed  
8 data streams.  
9

10           **49.**    The multi-media editing method of claim 44, wherein said  
11 programming comprises programming the switch assembly using one or more grid  
12 structures, individual grid structures containing data defining an association  
13 between input pins, output pins, and a project time line.  
14

15           **50.**    The multi-media editing method of claim 44 further comprising:  
16 representing the editing project as a hierarchical tree structure; and  
17 processing the hierarchical tree structure to provide at least one grid  
18 structure containing data that defines an association between input pins, output  
19 pins and a time line defined by the editing project.  
20

21           **51.**    The multi-media editing method of claim 44, wherein said  
22 programming comprises:

23                   defining a first grid structure containing data that defines an association  
24 between input pins, at least one output pin and a time line defined by the editing  
25 project; and

1 defining a second grid structure containing data that defines an association  
2 between different input pins, at least one different output pin and the time line  
3 defined by the editing project.  
4

5 **52.** The multi-media editing method of claim 51, wherein the first grid  
6 structure is associated with programming the switch assembly to process the  
7 uncompressed data stream.  
8

9 **53.** The multi-media editing method of claim 51, wherein the second  
10 grid structure is associated with programming the switch assembly to process the  
11 compressed data stream.  
12

13 **54.** The multi-media editing method of claim 51, wherein said defining  
14 of the second grid structure comprises deriving the second grid structure from the  
15 first grid structure.  
16

17 **55.** One or more computer-readable media having computer-readable  
18 instructions thereon which, when executed by a computer, implement the method  
19 of claim 44.  
20

21 **56.** A multi-media editing application executable on one or more  
22 computers to implement the method of claim 44.  
23  
24  
25

1       **57.**   One or more computer-readable media having computer-readable  
2 instructions thereon which, when executed by a computer, cause the computer to:

3       provide a switch assembly comprising multiple software-implemented  
4 matrix switches, individual matrix switches comprising one or more input pins and  
5 one or more output pins, the one or more input pins being routable to the one or  
6 more output pins, the switch assembly comprising:

7           a first switch configured to process uncompressed data streams to  
8 provide an uncompressed output data stream;

9           a second switch configured to process compressed data streams to  
10 provide a compressed output data stream; and

11          a third switch configured to receive both the uncompressed and  
12 compressed output data streams and process the data streams to provide a  
13 compressed output data stream that represents a user-defined multi-media  
14 editing project; and

15       program the switch assembly by defining a first grid structure containing  
16 data that defines an association between the first switch's input pins, at least one  
17 output pin and a time line defined by the editing project, and defining a second  
18 grid structure containing data that defines an association between the second  
19 switch's input pins, at least one output pin and the time line defined by the editing  
20 project.

21  
22       **58.**   The computer-readable media of claim 57, wherein the instructions  
23 cause the computer to derive the second grid structure from the first grid structure.  
24  
25

1           **59.**     The computer-readable media of claim 58, wherein the instructions  
2 cause the computer to derive the second grid structure by:

3                 determining whether any entries in the second grid structure are associated  
4 with a data stream source that is not in a format that is the same as or compatible  
5 with a format associated with the compressed output data stream that represents a  
6 user-defined multi-media editing project; and

7                 removing any entry that is not in the same or compatible format.  
8

9           **60.**     The computer-readable media of claim 59, wherein said format is  
10 associated with a frame rate.

11  
12           **61.**     The computer-readable media of claim 59, wherein said format is  
13 associated with a data rate.  
14

15           **62.**     The computer-readable media of claim 58, wherein the instructions  
16 cause the computer to derive the second grid structure by:

17                 copying the first grid structure;

18                 evaluating the copied grid structure to ascertain entries associated with data  
19 source streams that are modified in some way; and

20                 removing any grid entries associated with data source streams that are  
21 modified in some way.  
22

23           **63.**     A multi-media editing method comprising:

24                 providing a first software-implemented matrix switch comprising one or  
25 more input pins and one or more output pins, the one or more input pins being

1 routable to the one or more output pins, the first matrix switch being configured to  
2 process one or more uncompressed data streams and output an uncompressed data  
3 stream;

4 providing a second software-implemented matrix switch comprising one or  
5 more input pins and one or more output pins, the one or more input pins being  
6 routable to the one or more output pins, the second matrix switch being configured  
7 to process one or more compressed data streams and output a compressed data  
8 stream;

9 providing a third software-implemented matrix switch comprising multiple  
10 input pins and multiple output pins, the input pins being routable to one or more  
11 output pins;

12 receiving, with the third matrix switch, an uncompressed data stream from  
13 the first switch and a compressed data stream from the second switch; and

14 processing the received data streams with the third switch to provide a  
15 single compressed output data stream that represents a user-defined multi-media  
16 editing project.

17  
18 **64.** The multi-media editing method of claim 63, wherein said  
19 processing comprises:

20 compressing the uncompressed data stream received from the first switch  
21 using a software-implemented compressor element coupled with the third switch;  
22 and

23 routing the compressed data stream that was compressed by the compressor  
24 element to an input pin of the third switch.  
25



1       **65.**    The multi-media editing method of claim 63 further comprising  
2 receiving with the third switch, when available, a data stream from the second  
3 switch and, when a data stream is unavailable from the second switch, seeking  
4 with the third switch, a data stream from the first switch.

5  
6       **66.**    One or more computer-readable media having computer-readable  
7 instructions thereon which, when executed by a computer, implement the method  
8 of claim 63.

9  
10       **67.**   One or more computer-readable media having computer-readable  
11 instructions thereon which, when executed by a computer, cause the computer to:

12       process at least one compressed data stream to provide an output  
13 compressed data stream that comprises a portion of a user-defined multi-media  
14 editing project that is associated with a data stream source;

15       process one or more uncompressed data streams to manipulate the one or  
16 more uncompressed data streams to provide an output uncompressed data stream  
17 that comprises a different portion of a user-defined multi-media editing project  
18 that is associated with one or more data stream sources;

19       compress the output uncompressed data stream; and

20       associate the output compressed data stream and the compressed output  
21 uncompressed data stream together to provide a compressed stream that represents  
22 a user-defined multi-media editing project.

1       **68.**     The computer-readable media of claim 67, wherein the instructions  
2 cause the computer to provide a software-implemented matrix switch that  
3 associates the data streams to provide the user-defined multi-media editing project.

4  
5       **69.**     The computer-readable media of claim 67, wherein the instructions  
6 cause the computer to provide a software-implemented matrix switch that  
7 associates the data streams to provide the user-defined multi-media editing project,  
8 the software-implemented matrix switch being configured to receive the output  
9 compressed data stream when it is available, and seek the output uncompressed  
10 data stream when the output compressed data stream is unavailable.

11  
12       **70.**     One or more computer-readable media having computer-readable  
13 instructions thereon which, when executed by a computer, cause the computer to:

14       receive and process one or more uncompressed data streams with a first  
15 software-implemented matrix switch comprising one or more input pins and one  
16 or more output pins, the one or more input pins being routable to the one or more  
17 output pins to output an uncompressed data stream;

18       receive and process one or more compressed data streams with a second  
19 software-implemented matrix switch comprising one or more input pins and one  
20 or more output pins, the one or more input pins being routable to the one or more  
21 output pins to output a compressed data stream;

22       receive and process the uncompressed data stream that is output by the first  
23 switch and the compressed data stream that is output by the second switch with a  
24 third software-implemented matrix switch comprising multiple input pins  
25 individual ones of which receive data streams, and one or more output pins

1 individual ones of which provide data streams, the one or more input pins being  
2 routable to the one or more output pins to output, at one output pin, a compressed  
3 data stream that represents a user-defined multi-media editing project.

4  
5 **71.** The computer-readable media of claim 70, wherein the instructions  
6 cause the computer to:

7 compress the uncompressed data stream output by the first switch using the  
8 third switch; and

9 incorporate the compressed uncompressed data stream with the compressed  
10 data stream that is output by the second switch to provide the compressed data  
11 stream that represents the user-defined editing project.

12  
13 **72.** The computer-readable media of claim 70, wherein the instructions  
14 cause the computer to program the first and second switches using first and second  
15 data structures respectively associated with the first and second switches, each  
16 data structure providing a routing scheme for routing switch input pins to switch  
17 output pins.

18  
19 **73.** The computer-readable media of claim 72, wherein the first and  
20 second data structures comprise grid structures that provide an association  
21 between input pins, output pins and a time line defined by a user-defined multi-  
22 media editing project.

1        74.     The computer-readable media of claim 73, wherein the instructions  
2 cause the computer to derive the second grid structure from the first grid structure.

3  
4        75.     The computer-readable media of claim 74, wherein the instructions  
5 cause the computer to derive the second grid structure by:

6        copying the first grid structure;

7        evaluating the copied grid structure to ascertain entries associated with data  
8 source streams that are modified in some way; and

9        removing any grid entries associated with data source streams that are  
10 modified in some way.